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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/726,752	11/30/2000	Hong Jongill	1115.64887	1886

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EXAMINER

UHLIR, NIKOLAS J

ART UNIT

PAPER NUMBER

1773

DATE MAILED: 08/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/726,752

Applicant(s)

JONGILL ET AL.

Examiner

Nikolas J. Uhler

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 31 July 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2, 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

### DETAILED ACTION

1. This office action is in response to the amendment/arguments dated 7/31/03. Applicants amendment to claim 8 to insert the limitation that the non-magnetic layer is a metallic layer is sufficient to overcome the prior applied rejection under 35 U.S.C 103(a) in view of US649013911. Accordingly, this rejection is withdrawn. Further, applicant's amendment to claim 8 overcomes the prior claim objections. Accordingly, these objections are withdrawn.

#### ***Claim Rejections - 35 USC § 103***

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
3. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa et al. 9US2001/0050834).
4. Claim 8 requires a magnetoresistive film comprising a multilayered film including: a pinned magnetic layer whose magnetization is fixed, a nonmagnetic middle layer formed on the pinned magnetic layer, and a free magnetic layer formed on the nonmagnetic layer, wherein the free magnetic layer is provided with magnetization whose direction changes in accordance with an external magnetic field, wherein said nonmagnetic layer is a metal layer having a thickness  $\leq 34$  angstroms, and a coupling layer for exerting a coupling field for directing the magnetization of the pinned and free magnetic layers in opposite directions is provided on the free magnetic layer.
5. Regarding these limitations, Hasegawa et al. (Hasegawa), teaches a magnetoresistance film having a pinned magnetic layer 32 (equivalent to applicants

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claimed pinned magnetic layer), a non magnetic layer 33 (equivalent to applicants nonmagnetic layer) formed on the pinned magnetic layer, and a free magnetic layer 34 (equivalent to applicants claimed free magnetic layer) formed on the nonmagnetic layer. Further, a coercivity-improving layer 31 is provided directly below the pinned magnetic layer 31, and an antiferromagnetic layer 35 (equivalent to applicants biasing layer) is provided directly above the free magnetic layer (see figure 1 and sections 69 and 73). The coercivity-improving layer pins the magnetization of the pinned magnetic layer in a direction perpendicular to the films surface, and the antiferromagnetic layer applies a longitudinal biasing field to the free magnetic layer, thus orienting the magnetization of the free layer in parallel with the substrate when no external magnetic field is applied (section 80). Hasegawa teaches that suitable materials for forming the non-magnetic layer are metals, such as Cu, Cr, Au, and Ag (section 73). Thus, the limitation of claim 8 requiring the nonmagnetic layer to be a metal is met. Regarding the thickness of the nonmagnetic layer, Hasegawa teaches that the nonmagnetic layer is suitable formed to a thickness between 20-40 angstroms (section 73).

6. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a 20-angstrom thick nonmagnetic layer as the nonmagnetic layer in Hasegawa, as Hasegawa specifically teaches that this is a suitable thickness.

7. Claims 1-6 and 9-10 rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashi et al. (US5897969) in view of Taniyama et al. (US5897969).

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8. This rejection is maintained as set forth in the office action dated 3/28/03 (paper #8).

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashi modified by Taniyama as applied to claim 1 above, and further in view of Kawawake et al. (US6245450).

10. This rejection is maintained as set forth in the office action dated 3/28/03 (paper #8).

### ***Response to Arguments***

11. Applicant's arguments filed 7/31/03 have been fully considered but they are not persuasive. IN the instant case, applicant's arguments with respect to claim 8 have been rendered moot by the new grounds of rejection. Regarding the rejection of claims 1-6 and 9-10 over Hayashi in view of Taniyama, the applicant argues that it would not have been obvious to one of ordinary skill in the art to modify the Hayashi reference with the Taniyama reference in the manner suggested by the examiner. This is due to the fact that Hayashi utilizes antiferromagnetic NiO as a coupling layer, which the applicant asserts uses exchange coupling between the NIO layer and the free layer to control the magnetic domain of the MR layer. As CuO is non-magnetic, it is clear that using nonmagnetic CuO as a magnetic domain control film is different then using antiferromagnetic NiO for this purpose.

12. This argument is unpersuasive. The examiner agrees with the applicant that the use of Antiferromagnetic NiO as a domain control film is different then using non-magnetic CuO for the same purpose. However, the prior art, namely Taniyama,

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explicitly teaches that NiO and CuO are **equivalent** for use a magnetic domain controlling films in magnetoresistive elements. I.e. Taniyama states "an insulating *magnetic domain controlling film* made of **NiO or CuO or the like**," (column 14, lines 53-65). Thus, while the mechanism for controlling the magnetic domain of a MR film may be different when CuO is utilized as opposed to CuO, the prior art clearly recognizes that these materials are equivalent for achieving the same purpose.

Accordingly, applicant's arguments are found to be unpersuasive.

13. The applicants arguments with respect to the prior rejection of claim 7 are addressed above in sections 11 and 12 of this office action and for the sake of brevity will not be repeated.

#### ***Examiners Note***

14. The applicant has requested acknowledgement of the information disclosure statement filed 06/27/02. The examiner has carefully searched the file and has only found 3 information disclosure statement sheets (PTO form 1449), copies of which the examiner believes accompanied the prior office action. However, should these documents not have accompanied the prior office action, the examiner has included copies of the signed and initialed information disclosure statements for the applicants review. It is noted that the applicant in the response asserts that an additional copy of the IDS filed 6/27/02 was included for the examiners review. However, the examiner has been unable to locate this additional copy. If the applicant still feels there is an IDS missing from those enclosed with this office action, the examiner respectfully requests the applicant to submit an additional copy with their response.

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**Conclusion**

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nikolas J. Uhler whose telephone number is 703-305-0179. The examiner can normally be reached on Mon-Fri 7:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on 703-308-2367. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-

0389.

WU  
8/22/03

  
Paul Thibodeau  
Supervisory Patent Examiner  
Technology Center 1700